

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Pore opening dynamics in the exocytosis of serotonin¹

GUILLERMO RAMIREZ-SANTIAGO, Universidad Nacional Autonoma de Mexico, MONTSERRAT G. CERCOS, Instituto Nacional de Psiquiatria, ALEJANDRO MARTINEZ-VALENCIA, ISRAEL SALINAS HERNANDEZ, LEONARDO RODRÍGUEZ-SOSA, FRANCISCO F. DE-MIGUEL, Universidad Nacional Autonoma de Mexico — The current view of the exocytosis of transmitter molecules is that it starts with the formation of a fusion pore that connects the intravesicular and the extracellular spaces, and is completed by the release of the rest of the transmitter contained in the vesicle upon the full fusion and collapse of the vesicle with the plasma membrane. However, under certain circumstances, a rapid closure of the pore before the full vesicle fusion produces only a partial release of the transmitter. Here we show that whole release of the transmitter occurs through fusion pores that remain opened for tens of milliseconds without vesicle collapse. This was demonstrated through amperometric measurements of serotonin release from electrodeless vesicles in the axon of leech Retzius neurons and mathematical modelling. By modeling transmitter release with a diffusion equation subjected to boundary conditions that are defined by the experiment, we showed that those pores with a fast half rise time constant remained opened and allowed the full quantum release without vesicle collapse, whereas pores with a slow rise time constant closed rapidly, thus producing partial release. We conclude that a full transmitter release may occur through the fusion pore in the absence of vesicle collapse.

¹This work was founded by a DGAPA-UNAM grants IN200914 and IN118410 CONACYT GRANT 130031, and CONACyT doctoral fellowships.

Guillermo Ramirez-Santiago
Universidad Nacional Autonoma de Mexico

Date submitted: 18 Nov 2014

Electronic form version 1.4